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# An analysis of pre-reading strategies in deaf/hard of hearing students

Haley R. Nealey

*Washington University School of Medicine in St. Louis*

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**AN ANALYSIS OF PRE-READING STRATEGIES IN DEAF/HARD OF  
HEARING STUDENTS**

**by**

**Haley R. Nealey**

**An Independent Study  
submitted in partial fulfillment of the requirements for the  
degree of:**

**Master of Science in Deaf Education**

**Washington University School of Medicine  
Program in Audiology and Communication Sciences**

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**Approved by:  
Heather Hayes, Ph.D., Independent Study Advisor**

***Abstract***

***This literature review evaluates print knowledge ability in normally hearing pre-readers with and without specific language impairments. It then discusses implications of print knowledge ability in students who are deaf or hard of hearing and early intervention strategies.***

### **Acknowledgments**

I would like to thank my advisor, Dr. Heather Hayes (Washington University; St. Louis, MO), for supporting me throughout my time at Washington University and for her guidance in this independent study. She has been a fountain of knowledge and inspiration during this journey.

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## Abbreviations

1. Early Phonological Awareness Profile (EPAP)
2. Peabody Picture Vocabulary Test-III (PPVT)
3. Emergent Literacy Profile (ELP)
4. Analysis of Covariance (ANCOVA)
5. Test of Language Development for Preschool aged children (TOLD-P)
6. Phonologic Awareness Literacy Screening for the Pre-Kindergarten level (PALS-Pre-K)
7. Preschool Word and Print Awareness Assessment (PWPA)

## Introduction

The purpose of this independent study is to evaluate the print knowledge capabilities in pre-readers. Thus far, this research has only been compiled regarding hearing children and children with specific language impairments. My personal interest revolves around the possible implications that these findings may have on the deaf or hard of hearing population who use spoken language as their primary means of communication.

I am interested in the consistent deficit found in deaf or hard of hearing students regarding reading abilities. It has been stated that deaf or hard of hearing students in the United States graduate from high school on average at a fourth grade reading level (Traxler, 2000). Through this independent study, I evaluated what current research suggests about the influence print knowledge capabilities have in regards to later reading capabilities. I will first investigate what present levels should be expected in print knowledge abilities for pre-readers who are not deaf or hard of hearing. I will evaluate what studies have found concerning how pre-reading print knowledge abilities affect future reading capabilities in these children. I will then discuss possible implications for the deaf or hard of hearing population and the teachers who teach them.

It is necessary to construct a definition of students who can be categorized as pre-readers, or non-readers, before we divulge further into this literary analysis. Treiman and colleagues describe “children who cannot sound out simple nonwords as non-readers.” (Treiman, Cohen, Kessler, Mulqueeney, & Schechtman, 2007, p. 1458) Typical reading tests have also been used to determine whether a child is a pre-reader. The assessments provide evidence of these children identifying “labels correctly when they appeared in their normal setting.” (p. 1458). The outcome of these successful identifications is dependent on keeping the words within the normal context with which the children are familiar. These researchers found that even if an incorrect letter

replaced any letter in the word, the children with pre-reading proficiency would not notice a difference. They were also able to assign the absolute influence of picture recognition when paired with a word. The students would present the tester with a label for the picture regardless of the word placed beneath. This was even the case when the children underwent limited training of the word and picture matches.

It is believed that young children understand certain underlying constructs of written language even before they gain facility with letters and words. Treiman and colleagues (2007) shed light on the importance of this pre-reading recognition when the student is learning writing and reading. If the child can glean a general idea of the basic concepts that govern writing, then written language will generally be easier to attain. This idea should make obvious sense until you are tasked with breaking down the written form of the English language and every particular rule and structure it necessitates from its readers. If we can capture a relatively small amount of practical rules, that if absolutely understood may impact a student's reading abilities in the future, then an educator may explicitly expose their students to these rules and influence the students' latter educational success.

### **What is Print Knowledge?**

Print knowledge deals with the understanding of the general constructs that govern each specific written language. Because graphemes are not visually representative of the sounds that they correspond with, understanding of print knowledge by a pre-reader is an impressive task. Treiman and colleagues (2007) comment that “(grapheme) marks rarely look like what they represent” (p. 1459). This is especially difficult for an age group of children that have, thus far, learned to gain visual information through the messages created by pictures or drawings. Treiman and colleagues state that, “(written language) differs from drawing in representing

language rather than representing meaning directly.” (p. 1459) The breakdown between letters and meaning is comprised of multiple steps. Because of this, processing whether a symbol should be processed and if it carries information is difficult. The children may not be aware of whether a symbol is found in their native written language and whether or not it is important enough to apply meaning to. In the pre-reading population, it is interesting to regard the understanding of print that the children have not been explicitly taught. There are many different constructs of print knowledge that may be evaluated. Treiman and colleagues give the example that “symbols are arranged in straight lines.” (p. 1458) These rules that govern the English language system are important for children to understand before and as they are learning to read. The understanding of these unchanging facets that make up the language structure may be beneficial to learning reading and increasing reading capabilities at later ages.

### **Why is Print Knowledge Important?**

My main objective in conducting this independent study is to acknowledge a reading precursor that, if explicitly taught during a critical period, may contribute to greater reading abilities in students, specifically deaf or hard of hearing students. If pre-readers’ consistent understanding of print knowledge can have positive effects on their later reading proficiency, then curricula materials that highlight these skills could be useful in early childhood as a prevention measure for students at risk for later reading difficulties. I am specifically interested in reading abilities because it has been recorded that the average student who is deaf or hard of hearing graduates from high school at a fourth grade reading level (Traxler, 2000).

Many researchers have given weight to the hypothesis that print knowledge is closely related with reading and language abilities later in life. Previously, oral language abilities have been perceived to affect our desired outcome more than print knowledge. Dickinson and



colleagues (2003) state, “Metalinguistic skills and print knowledge at age 3 made significant contributions to reading achievement above and beyond that provided by language development.” (p. 466) Later in this text I will describe how the studies were conducted to draw this conclusion. These researchers are discussing new avenues of early childhood education that can specifically impact later reading abilities.

Can print knowledge be affected by oral language skills? Bowey and Patel (1988) believe that, “There is some evidence that oral-language abilities are closely related to the emergence of print knowledge and phonological ability in Kindergarten.” (p.372) If this evidence holds true, then we assume that children who have oral language delays (e.g., children who are deaf or hard of hearing, on average) would have delayed print knowledge skills. Thus, it is important to investigate print knowledge in general, to get information about how deaf educators may boost print knowledge understanding and the specific language abilities that correlate with print knowledge to create more successful readers later in students’ educational career. After reviewing the studies concerning print knowledge in hearing pre-readers, I will discuss possible applications for these ideas.

### Study 1: Young Children’s Knowledge About Printed Names

Treiman, Cohen, Mulqueeny, Kessler, & Schechtman (2007)

Treiman and colleagues (2007) investigated print knowledge of important words for children of the pre-reading age: personal names. Not only are these names interesting to the young children but “appear to be learned early and to play an important role in literacy

development.” (p.1459) Thus, names work as an ideal basis to assess present levels of print knowledge understanding from children who exhibit pre-reading skills.

Treiman and colleagues (2007) framed their study around four seemingly permanent English language-specific properties, each of which was examined in a separate experiment. The first of these considered a child’s preference for names that only used letters from the Latin alphabetic inventory. The second experiment examined recognition of the conventional capitalization pattern. The third concerned letter orientation in names. These names were positioned horizontally from left to right, vertically from top to bottom, diagonal from upper right to lower left, diagonal from lower right to upper left, and arranged in a random, nonlinear orientation. The final experiment asked each child to choose the correct spelling between multiple versions of his name. Each adaptation of spelling had the correct amount of letters and it followed the American English construct of orientation. They used “visually similar” letters from the Latin alphabet inventory as replacements for any letter used in the original spelling.

The participants for the experiments fell into three separate groups. All three groups were assessed for the first two experiments while only the first two groups were investigated for the final two experiments. Titles for each of the groups were as follows: Younger Preschoolers, Older Preschoolers, and Kindergarteners. The corresponding ages, in years, were: 3.2-4.0, 4.5-5.4, and 5.4-6.9. Some participants were enlisted for multiple assessments, whereas others only served for one experiment. These age groups are important to note as they directly coordinate with three separate groups along the spectrum of school aged pre-readers. The authors were able to discuss the differences in print knowledge among these three groups and evaluate the effects of age on the desired results.

The researchers formatted the experiments by creating a play-like, age-appropriate activity. This format held the participants' attention and made the task fun and exciting. The experimenter controlled sets of printed cards that correlated with each experiment. The participants were presented with a toy trashcan and a toy mailbox. The children were then charged with deciding whether the card presented them with authentic English Latin spelling constructs. If so, they were to deposit the card into the toy mailbox. If not, they discarded it into the toy trashcan. The professional instructed the participant to pick the card that "looks like how a name in English should look" to put in the mailbox (Treiman et al., 2007, p. 1462). This procedure was carried out for every experiment.

This study was completed to see if pre-literate children could recognize and apply English language constructs before they received formal English instruction. The result was that "children younger than 4 years of age, even those who could read no simple words, showed some knowledge about the horizontal orientation of English names, the Latin letters that make them up, and their right directionality." (p. 1458)

The results from this study showed the pre-readers' reliable preference for Latin English characters. "The nonreaders chose the Latin letter displays 94% of the time." (Treiman et al., 2007, p. 1462) Concerning capitalization patterns, the pre-literate children were unable to identify appropriate English capitalization constructs among words described as names. They stated, "young preschoolers thus appeared to have no knowledge of the conventional capitalization patter for names." The results recorded did not find a significant preference for the "Ab" name structure until the children reached Kindergarten. The study was also able to uncover that when older preschoolers who could not read were presented their own name in the

different capitalization patterns, their preference for the “Ab” pattern only became significant if the first letter of their name changed drastically when converted from lower to upper case.

Understanding the orientation of a word, or how the letters are aligned and the way in which they are meant to be decoded, is essential to learning how to read. When the children were asked to select the correct orientation of their name, they chose the correct orientation correlated with their native language, English. The results show that the older and younger preschoolers displayed a significant preference for the horizontal word orientation. The study also showed that the children were least likely to choose the nonlinear version. This is important because the results did not vary significantly between the age groups. The researchers explain that “even those preschoolers who could not read any of the simple words in our reading task preferred horizontally arranged names.” (Treiman et al., 2007, p. 1466) These results lead us to believe that regardless of a pre-readers’ age, between ages of three and seven, the child should accept their name most frequently if it is displayed in a horizontal orientation.

All of these results are significant in understanding the print knowledge proficiency of hearing pre-readers. The first three experiments of the Treiman and colleagues (2007) study provided significant support that pre-reading preschool- and kindergarten-aged students have the capacity to understand English language constructs of letter orientation. A name displayed horizontally was favored heavily over any other orientation.

The final experiment within this battery of tests concentrated on the pre-readers’ understanding of the English language symbols that created their own names. For this experiment, the first, middle, or final, letter in the students’ names were replaced with a different letter found in the English alphabet. These replacement letters were put into two categories: letters that were visually similar and letters that were visually dissimilar. Another modification

added to this test was that the letters were hand written. A few factors make this variable interesting. The child would have never gained practical exposure to that person's handwriting previous to this assessment. Also, the variability of handwriting could not have been regulated, as it would have been if a typed font had been used. Because this task is more specific, a person would predict that the students would be less consistent in choosing the correct spelling of their name, especially when presented with visually similar letters. However, the younger and older preschoolers consistently chose the correct spelling of their name.

The older preschoolers did significantly better overall at eliminating the incorrect presentation of their name than the younger preschoolers. However, all participants consistently chose the correct spelling of their names. The younger preschoolers experienced difficulty when the replaced letter was in the medial and final position. This is not necessarily surprising because the letter that a child recognizes most prominently is the first letter of their name. It is also interesting to see that the difference between visually similar and visually dissimilar letter replacements led to different choices for older preschoolers. Treiman and colleagues also found that if the students in either group had shorter names, they were less likely to choose incorrect spellings whether the letter was similar or dissimilar.

These findings provide significant information related to the goal of this literature review. Some degree of print knowledge exists in pre-reading children. Treiman and colleagues (2007) state that "even the younger preschoolers, who were less than 4 years of age on average and most of whom could not read any real words, had some knowledge about the shapes of letters in their own names." (p. 1469) This shows that very young hearing children have some facility with the symbols that make up their language. The researchers also found that "young preschoolers' knowledge about their own names extends beyond the characteristics that are shared by all words

in all writing systems, such as linearity and lack of iconicity.” (p.1469) Not only does this construct relate to the children’s names but it regards the entire language structure as a whole. These pre-readers understand rules that directly relate to reading and writing before they have been explicitly taught them. These pieces of information could form the foundation by which the children would more easily gain facility with reading. The next study I will review describes the relationships between print knowledge, oral language, and reading.

Study 2: The Comprehensive Language Approach to Early Literacy:  
The Interrelationships Among Vocabulary, Phonological Sensitivity,  
and Print Knowledge Among Preschool-Aged Children

Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe (2003)

This study argues that, not only is there a relationship between print knowledge and later reading ability, but that “there are a variety of oral-language skills that are critical in emergent literacy and continue to play vital roles in subsequent reading achievement.” (Dickinson et al., 2003, p. 465) They call this theory of reading acquisition the CLA, or the comprehensive language approach. These researchers were able to find merit in this approach and glean possible benefits of print knowledge curriculum in early intervention settings. The research found in this study is important because it provides evidence towards the theory that print knowledge is a beneficial prerequisite for reading.

In this study, the researchers obtained information from 350 four-year-old children who were enrolled in a Head Start program (Dickinson et al., 2003). The researchers believed that previous studies had lacked diversity among culture and socioeconomic status and strived to

create a more appropriate participant pool. Their participant group was made up of fifty-nine percent White, fifteen percent African-American, and seven percent Asian-American children. The other participants did not divulge their ethnicity. Forty-five percent of the participants were from bilingual homes. Monthly income of all participant households was between \$500 and \$1,500 per week. By having a participant sample that more directly represented the general population of these Head Start programs, the researchers were able to identify results that would mirror and be beneficial to this specific population.

After compiling the test population, the researchers completed a battery of tests and correlational analysis on the participants. The Early Phonological Awareness Profile (EPAP) was used to create a general phonological awareness variable (Dickinson et al., 2003). This test included the participants' ability to delete phonemes at a single word level when prompted. It also looked at the participants' abilities to recognize and produce rhymes. The Peabody Picture Vocabulary Test-III (PPVT) was used to test receptive vocabulary and the Emergent Literacy Profile (ELP) tested the child's print knowledge ability. The ELP provides information on the participant's ability to read environmental print. It assesses 0-2 points for each response, zero for a response that is incorrect in content and semantics, one for a response that is incorrect in content but semantically correct, and two points for a response that is correct both in semantics and content. The ELP also looks at the participant's ability to identify letters, write their name, and pick a correct word out of a display featuring many non-words. By assessing all of these variables, the researchers were able to gain a greater understanding of the current abilities found in their participants.

Dickinson and colleagues (2003) controlled for participant background factors and completed a correlation analysis using the results gained from the previously stated assessments.

They also examined the impact that one result deficit had on the other results. They completed this test using an analysis of covariance (ANCOVA) model. The deficit correlation that would be most beneficial to understand regarding the deaf or hard of hearing population is the relationship between low vocabularies, as found by the PPVT, in regards to the phonological sensitivity, found in the EPAP, and early literacy.

The results of this study give us important information regarding the relationships between print knowledge, phonological awareness, and vocabulary. It is important to first note that among the results found from the PPVT assessment, the vocabulary ability of this participant group was significantly lower than that of the national norm. The results found that the three variables were moderately correlated ( $r > .40$ ). Literacy ability was directly correlated with each of these variables. Through these assessments, the hypothesis created for this study that receptive vocabulary, phonological awareness, and early print knowledge are interrelated to acquiring literacy, was supported. The correlation analysis found significant relationships between the variables and to prospective literacy abilities.

One background factor proved to be a significant variable by affecting the participants' abilities through the battery of tests. This variable was the child-to-adult ratio which the researchers believe provides information on the parent-child interaction time. The participant assessment of print knowledge showed negative results when a low child-to-adult ratio existed. I find this piece of information to be very valuable. It underlines the importance of parent-child interaction in the presentation and exposure to environmental print that will lead to better literacy success for the child in the future. If the parent is not providing this background knowledge, then what is the most efficient way to support the student in these deficits at the early



intervention level? This idea will be discussed further in the implications for future research portion of this text.

This study gives significant importance to the interrelationship between oral language and literacy. Age-appropriate oral language capabilities may be difficult to obtain for deaf or hard of hearing students. Through this study, we are able to see what specific oral language components attribute to a better aptitude in reading. The study finds vocabulary, metalinguistic skills, and print knowledge to be the literacy components most interrelated with reading achievement in later years. (Dickinson et al., 2003). If these overall language developments led to higher ability in reading, then explicit training could be beneficial. If these language developments are connected to oral language capabilities, then the pre-reading children who are deaf or hard of hearing could gain significant contributions from this early instruction.

### Study 3: Predictors of Print Knowledge in Children With Specific Language Impairments:

#### Experimental and Developmental Factors.

McGinty & Justice (2009)

When considering the deaf or hard of hearing population, it is beneficial to look at print knowledge among children with specific language impairments. Within both of these populations, a deficit concerning language acquisition can be found. Because no studies have yet been conducted regarding print knowledge and children who are deaf or hard of hearing, the population of specific language impairments may give us valuable information in regards to print knowledge in both populations.

This study looks into associations among print knowledge and other pre-literacy components much like the previous study. It also studies the hypothesized benefits of home

literacy programs among students with specific language impairments who may have deficits among the studied components. Because of this addition of home literacy programming, we are able to identify if this intervention method may also be beneficial to deaf or hard of hearing children. The hypothesis of this study revisits the idea that children without an average amount of parent interaction may be lacking in print knowledge. It also studies an intervention method that may counteract this deficit for many families.

The participants for this study included forty-one mothers and their children (Justice & McGinty, 2009). These children were previously diagnosed and tested by the researchers to have specific language impairment and no other conditions that may skew the data. The average age for the participants was three and a half years. Thirty of the participants were boys and eleven were girls. Seventy-eight percent of the participants were White, seven percent were African American, five percent were Hispanic/Latino, and the remaining participants were of multiracial decent. Although this participant group should be more representative of the general population, the results will still be beneficial for our purposes.

This study looked at three main variables. The child's developmental risk factors, measures of family demographics/ home literacy experiences, and outcome measure of the child's print knowledge were all assessed (Justice & McGinty, 2009). All interactions were carried out during a home visit. Researchers administered tests, mothers answered a questionnaire, and a mother-child interaction was videotaped where the mother read a story to her child.

To assess the measures of the child's developmental risk factors, a Test of Language Development for Preschool-Aged children (TOLD-P), was administered. Through this test, the degree of the child's language difficulty is assessed. This test produces a spoken language

quotient that describes the child's receptive and expressive language abilities. The Child Behavior Checklist was also administered to assess this variable. This was filled out by the mother and was used to better understand that attention difficulties of each participant.

The measures of family demographics and home literacy experiences were assessed in screening interviews for the participants where the researcher gained background and family demographic information (Justice & McGinty, 2009). The interviewer also presented the parent with a literacy activities scale where the parent could discuss the frequency of literacy driven interactions. The researchers also evaluated the parent-child interaction through the video recording. These observational scales regarded the mother's instructional quality and maternal sensitivity. The researchers also used the maternal supportive presence scale to appraise the degree of instructional support the mother gave to the child during their story reading activity.

The print knowledge outcome measures were evaluated by administering a Phonological Awareness Literacy Screening for Preschool (PASL-Pre-K). They used the PALS-Pre-K to measure the child's knowledge of uppercase letters. The child is asked to name each letter when presented randomly. The Preschool Word and Print Awareness Assessment (PWPA) was also given to assess print concepts. Through this test, the researchers find the child's facility among 14 print concepts. These concepts include print forms, meaning of print, print directionality, among others. These measures are assessed during a storybook reading and surpass the word level.

The results from this study find that the measures of family demographics and home literacy experiences had the greatest correlation with print knowledge outcomes. This is important for our study because it provides evidence that home literacy experience can be beneficial to children with lower language abilities. They are able to gain print knowledge at a

rate similar to the normed group without specific language impairments, if they have successful home literacy experiences.

### **Implications for Further Research**

These prominent studies suggest a correlation between print knowledge and future literacy outcomes. Children seem to have a general understanding of the rules that govern Latin English written constructs before these ideas have been explicitly taught. This could be a beneficial precursor when learning how to read. Because no studies have evaluated pre-reading print knowledge in the deaf or hard of hearing population, I would be interested to see if these abilities were at the same level as their hearing peers. Deficient print knowledge could be one component that currently leads to children who are deaf or hard of hearing performing at an average reading level far below that of their hearing counterparts.

The literature also points to the benefit of home literacy programs regarding children's print knowledge. It was also found that a poor child-to-adult ratio that leads to fewer interactions also constituted a lower score in print knowledge understanding by the child. These measures showcase the need for intervention. Home literacy programs and other print knowledge curricula could be a means of early intervention used to eliminate this deficit. Future research concerning participants who are deaf or hard of hearing and print knowledge is imperative. This necessary research should include deaf or hard of hearing children's normative ability level in print knowledge and whether or not early intervention measures are successfully increasing these print knowledge outcomes.

Many early intervention print knowledge curricula could be introduced and studied with pre-reading children who are deaf or hard of hearing. The *What Works Clearinghouse* website (<http://ies.ed.gov/ncee/wwc/>) describes several programs related to print knowledge, some

more effective than others. For example, *Literacy Express* is a preschool curriculum currently available to introduce print knowledge and phonological awareness experiences. It uses flash cards and games that expose children to print. *Creative Curriculum for Preschoolers* is another early intervention strategy designed to increase print knowledge. It guides teachers to facilitate small and large group parent-child sessions. It also uses assessments and online data tracking records to evaluate participant growth. Both of these print knowledge intervention strategies could be very beneficial to pre-readers who are deaf or hard of hearing. This explicit instruction at a young age could lead to increased ability in reading once the children reach elementary school. Future research studies should investigate this measure and deem whether deaf students do have a print knowledge deficit and whether or not these interventions can lead to improvements in this area. If that is the case, these specific print knowledge intervention methods should be researched with the deaf or hard of hearing population. The results from these studies could then be implemented in deaf or hard of hearing early intervention programs.

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